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VERIFICATION OF A TRANSLATION

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S I R :

I, the below named translator, hereby declare that:

1. My name and post office address are as stated below.

2. That I am knowledgeable in the English language and the Japanese language.

3. The attached document is an English translation of Japanese Application 2002-362533 which was filed with the Japanese Patent Office on December 13, 2002.

4. I believe the attached document is a true and complete translation of Japanese Application 2002-362533 which I have reviewed in order to prepare the attached translation.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to

be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

March 23, 2007
Date

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[DOCUMENT NAME] SPECIFICATION

[TITLE OF THE INVENTION] OPTICAL DISC APPARATUS

[SCOPE OF THE CLAIM FOR PATENT]

[Claim 1]

An optical disc apparatus, comprising:

an optical unit for projecting a laser light to an optical disc and converting a reflection light reflected from said optical disc into an electrical signal;

signal processing means for processing said electrical signal from said optical unit to have said electrical signal converted into reproduction information required for reproduction;

parameter storage means for storing therein a parameter contained in said reproduction information from said signal processing means; and

reproduction time computing means for computing a reproduction time based on said parameter stored in said parameter storage means.

[Claim 2]

An optical disc apparatus as set forth in claim 1, which further comprises optical disc reproduction means for determining a reproduction start position based on said parameter stored in said parameter storage means.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FIELD OF THE INVENTION]

The present invention relates to an optical disc apparatus for resuming reproduction of information recorded on an optical disc, and more particularly to an optical disc apparatus for obtaining reproduction time information even if the reproduction time information is not contained as address information in compressed audio information recorded on an optical disc, and resuming reproduction of the compressed audio information on the basis of the reproduction time information in the even that a power supply to the optical disc apparatus is turned off in the midst of the reproduction of the compressed audio information, and then turned on.

[0002]

[PRIOR ART]

The conventionally optical disc apparatus is designed to store address information indicative of a reproduction position of information recorded on an optical disc, and to start reproduction of the information on basis of the stored address information (hereinafter simply referred to as "resume reproduction") when a power supply to the optical disc apparatus is turned off in the midst of reproduction of the information, and then turned on (see patent document 1).

[0003]

[patent document 1]

[0004]

Japanese Patent Laid-Open Publication No. 2002-230781 (see paragraphs 0005 and 0006)

[0005]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

Compressed audio data represented by, for example, MP3 (MPEG-1 Audio Layer-3) emerged in recent years may not include information on a reproduction time (hereinlater simply referred to as "reproduction time information") in the address information of the optical disc. However, the conventional optical disc apparatus can not obtain reproduction time information, and resume reproduction of the compressed audio data in the even that the power supply was turned off, and then turned on, resulting from the fact that the conventional optical disc apparatus is simply designed to start reproduction of the compressed audio data on the basis of the address information without extracting the reproduction time information from the address information.

[0006]

It is therefore an object of the present invention to provide an optical disc apparatus which can compute a reproduction time, even if the reproduction time information is not contained as address information in compressed audio information, and to resume reproduction of the compressed audio information on the basis of the computed reproduction time in the even that the power supply to the optical disc apparatus is turned off in the midst of the reproduction of the compressed audio information, and then turned on.

[0007]

[MEANS FOR SOLVING THE PROBLEMS]

In order to solve the above-mentioned problem, there is provided an optical disc apparatus, comprising; an optical unit for projecting a laser light to an optical disc and converting a reflection light reflected from the optical disc into an electrical signal; signal processing means for processing the electrical signal from the optical unit to have the electrical signal converted into reproduction information required for reproduction; parameter storage means for storing therein a parameter contained in the reproduction information from the signal processing means; and reproduction time computing means for computing a reproduction time based on the parameter stored in the parameter storage means. The reproduction information herein used is intended to mean data required for reproduction of music data, image data, and the like. The parameter herein used is intended to mean information on address number, bit rate, monaural/stereo and the like.

[0008]

The optical disc apparatus thus constructed according to the present invention can compute a reproduction time information, even if the reproduction time information is not contained as address information in compressed audio information, and to resume reproduction of the compressed audio information on the basis of the computed reproduction time in the even that the power supply to the optical disc apparatus is turned off in the midst of the reproduction of the compressed audio information, and then turned on, resulting from fact that the optical disc apparatus is operative to compute a reproduction time based on the parameter contained in the reproduction information.

[0009]

The optical disc apparatus according to the present invention further comprises optical disc reproduction means for determining a reproduction start position based on the parameter stored in the parameter storage means.

[0010]

The optical disc apparatus thus constructed according to the present invention can compute a reproduction time, even if the reproduction time information is not contained as address information in compressed audio information, and resume reproduction of the compressed audio information on the basis of the reproduction time in the even that the power supply to the optical disc apparatus is turned off in the midst of the reproduction of the compressed audio information, and then turned on, resulting from the fact that the optical disc apparatus is operative to determine a reproduction start position based on the parameter stored in the parameter storage means.

[0011]

[EMBODIMENTS OF THE INVENTION]

The construction of the optical disc apparatus according to one embodiment of the present invention will be firstly described hereinafter with reference to FIG. **1**. Here, the optical disc apparatus **100** is intended to mean an apparatus for projecting a laser light to a pit formed on an optical disc **200** and detecting a reflection light reflected from the pit formed on the optical disc **200** to have the reflection light converted to an information signal to be reproduced therethrough. The optical disc **200** may be constituted by a compact disc (hereinlater simply referred to as "CD"), a digital versatile disc (hereinlater simply referred to as "DVD"), and the like. It is assumed in the description about the present embodiment that the optical disc **200** is constituted by a CD for the purpose of simplicity but it is of course needless to mention that the optical disc **200** may be constituted by any other storage medium.

[0012]

As shown in FIG. **1**, the optical disc apparatus **100** according to the present invention comprises a spindle motor **101** for driving the optical disc **200** to have the optical disc **200** rotated, a spindle motor driving circuit **102** for controlling the spindle motor **101** to have the spindle motor **101** rotated at a predetermined number of rotations per second, and an optical unit **103** including a semiconductor laser source, not shown, for projecting a light beam to the optical disc **200** and a photoelectric conversion element, not shown, for receiving a reflection light reflected from the optical disc **200** to have the reflection light converted to an electric signal.

[0013]

The optical disc apparatus **100** further comprises a laser driving circuit **104** for controlling the optical unit **103** to have the optical unit **103** project the light beam at an arbitrary level, an objective lens **105** intervening between the optical unit **103** and the optical disc **200** to have the reflection light reflected from the optical disc **200** focused on

the photoelectric conversion element forming part of the optical unit **103**, an actuator unit 106 for actuating the objective lens **105**, and actuator control means **107** for controlling the actuator unit **106** to have the actuator unit 106 actuate the objective lens **105** between the optical unit **103** and the optical disc **200**. Here, the actuator unit **106** is constituted by a focus actuator **106a** for actuating the objective lens **105** to have an optical spot of the objective lens **105** moved along a focus direction parallel to an optical axis of the objective lens **105** and a tracking actuator **106b** for actuating the objective lens **105** to have the optical spot of the objective lens **105** moved along a radial direction of a track of the optical disc **200**.

[0014]

The optical disc apparatus **100** further comprises a radio frequency circuit (RF circuit) **108** for producing a radio frequency signal (RF signal) and an error signal such as for example a focus error signal, a tracking error signal, and the like, based on the electrical signal from the optical unit **103**, a servo control circuit **109** for driving the spindle motor driving circuit **102** and the actuator control means **107** to have the spindle motor driving circuit **102** and the actuator control means **107** respectively controlled based on the error signal from the RF circuit **108**, and a signal processing circuit **110** for converting the RF signal from the RF circuit **108** into reproduction information such as, for example, sound information, image information and the like. Here, the signal processing circuit **110** functions as signal processing means according to the present invention.

[0015]

The optical disc apparatus **100** further comprises a dynamic random access memory (DRAM) **111** for storing therein reproduction information and the like, a read only memory (ROM) **112** for storing therein a control program executable to control the whole operation of the optical disc apparatus **100**, and a central processing unit (hereinlater simply referred to as "CPU") **113** for executing the control program stored in the ROM **112**. Here, the DRAM **111** functions as parameter storage means, the ROM **112** and the CPU **113** collectively function as reproduction time computing means and optical disc reproduction means to compute a reproduction time based on parameters stored in the DRAM **111** and to determine a reproduction start position based on the parameters stored in the DRAM **111** after the optical disc apparatus **100** is rebooted. The parameters stored in the DRAM **111** include, for example, but not limited to, information on address number, bit rate, monaural/stereo and the like.

[0016]

The operation of resuming reproduction performed by the optical disc apparatus **100** according to the embodiment of the present invention will be then described hereinafter

with reference to a flow chart shown in FIG. **2**. The CPU **113** is operated to execute the control program stored in the ROM **112** to control the optical disc **200** to have the optical disc **200** rotated (in step **S101**). At this time, a reflection light reflected from the optical disc **200** is converted into an electric signal by the optical unit **103**. The electric signal is then converted into reproduction information by the RF circuit **108** and the signal processing circuit **110**.

[0017]

When the reproduction information is obtained, step **S101** goes forward to step **S102**, in which the CPU **113** is operated to execute the control program stored in the ROM **112** to store parameters contained in the reproduction information in the DRAM **111**. In addition, the CPU **113** is operated to execute the control program stored in the ROM **112** to update the parameters stored in the DRAM **111** whenever the parameters contained in the reproduction information have changed.

[0018]

The judgment is then made (in the step **S103**) on whether or not a power supply, not shown, of the optical disc apparatus **100** is turned off. When the power supply to the optical disc apparatus **100** is not turned off, step **S103** goes back to step **S102**. When, on the other hand, the power supply to the optical disc apparatus **100** is turned off, and then turned on, the optical disc apparatus **100** is rebooted (in the step **S104**).

[0019]

When the power supply to the optical disc apparatus **100** is turned off, and then turned on, the optical disc apparatus **100** is rebooted, step **S104** goes forward to step **S105**, in which the CPU **113** executes the control program stored in the ROM **112** to read, from the DRAM **111**, parameters corresponding to the time when the power supply to the optical disc apparatus **100** was turned off.

[0020]

When the CPU **113** reads, from the DRAM **111**, the parameters corresponding to the time when the power supply to the optical disc apparatus **100** was turned off, step **S105** goes forward to step **S106**, in which the CPU **113** executes the control program stored in the ROM **112** to compute, based on the parameters read from the DRAM **111** in accordance with following expressions, a reproduction time corresponding to the time when the power supply to the optical disc apparatus **100** is turned off.

[0021]

Monaural sound:

Reproduction time (sec.) = {the Number of Addresses/Bit Rate (kbp/sec.)}/1

Stereo sound:

Reproduction time (sec.) = {the Number of Addresses/Bit Rate (kbp/sec.)}/2

The first expression is used for the optical disc of the monaural recording format, while the second expression is used for the optical disc of the stereo recording format.

[0022]

When the CPU **113** computes a reproduction time from the parameters read from the DRAM **111**, step **S106** goes forward to step **S107**, in which the CPU **113** executes the control program stored in the ROM **112** to produce a control signal to have a display unit (not shown) display the reproduction time, and to produce a signal to resume reproduction of music data, image data, and the like on the basis of parameters corresponding to the number of addresses when the power supply to the optical disc apparatus **100** was turned off in the midst of the reproduction of the compressed audio information, and then turned on (in step **S107**).

[0023]

From the foregoing description, it will be understood that the optical disc apparatus according to the embodiment of the present invention can obtain reproduction time information, even if the reproduction time information is not contained as address information in compressed audio information, in the event that the power supply to the optical disc apparatus is turned off in the midst of reproduction of the compressed audio information, and then turned on, resulting from the fact that the optical disc apparatus is operative to compute a reproduction time from the number of addresses and bit rate contained in the reproduction information.

[0024]

From the foregoing description, it will be understood that the optical disc apparatus according to the embodiment of the present invention can obtain reproduction time information, and resume reproduction of the compressed audio information on the basis of the obtained reproduction time information, even if the reproduction time information is not contained as address information in compressed audio information, in the event that the power supply to the optical disc apparatus is turned off in the midst of reproduction of the compressed audio information, and then turned on, resulting from the fact that the optical disc apparatus is operative to determine a start position on the basis of the number of addresses stored in DRAM **111**.

[0025]

[EFFECTIVENESS OF THE INVENTION]

As will be seen from the foregoing description, the optical disc apparatus according to the present invention can obtain reproduction time information from a parameter

contained in reproduction information, even if the reproduction time information is not contained as address information in compressed audio information, in the event that the power supply to the optical disc apparatus is turned off in the midst of reproduction of the compressed audio information, and then turned on.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIG. 1]

FIG. 1 is a block diagram showing the optical disc apparatus according to the embodiment of the present invention.

[FIG. 2]

FIG. 2 is a flow chart showing an operation of resuming reproduction performed by the optical disc apparatus according to the embodiment of the present invention.

[EXPLANATION OF THE REFERENCE NUMERALS]

103: optical unit
110: signal processing circuit (signal processing means)
111: DRAM (parameter storage means)
112: ROM (reproduction time computing means, optical disc reproduction means)
113: CPU (reproduction time computing means, optical disc reproduction means)

[NAME OF DOCUMENT] ABSTRACT

[ABSTRACT]

[PROBLEM]

It is an object of the present invention to provide an optical disc apparatus which can compute a reproduction time from a parameter contained in reproduction information, even if the reproduction time information is not contained as address information in compressed audio information, even if the power supply to the optical disc apparatus is turned off in the midst of reproduction of the compressed audio information, and then turned on.

[MEANS FOR SOLVING]

In the optical disc apparatus according to the present invention, the CPU **113** executes a control program stored in the ROM **112** to compute, based on a parameter from the DRAM **111**, a reproduction time corresponding to the time when the power supply to the optical disc apparatus was turned off. Then, the CPU **113** executes the control program stored in the ROM **112** to produce a control signal to have a display unit (not shown) display the reproduction time, and to produce a signal to resume reproduction of music data, image data, and the like on the basis of the reproduction time even if the power supply to the optical disc apparatus is turned off in the midst of the reproduction of the compressed audio information, and then turned on.

[SELECTED DRAWING] FIG. **2**